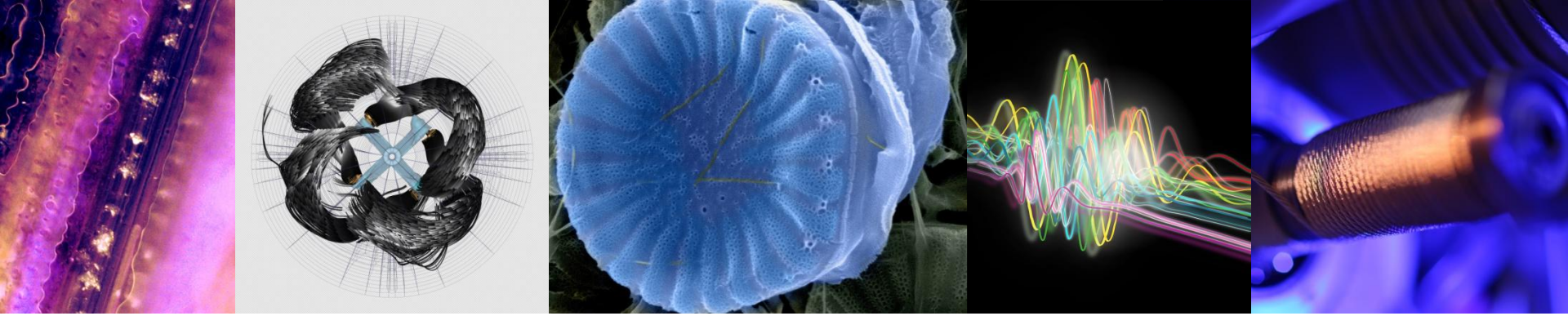
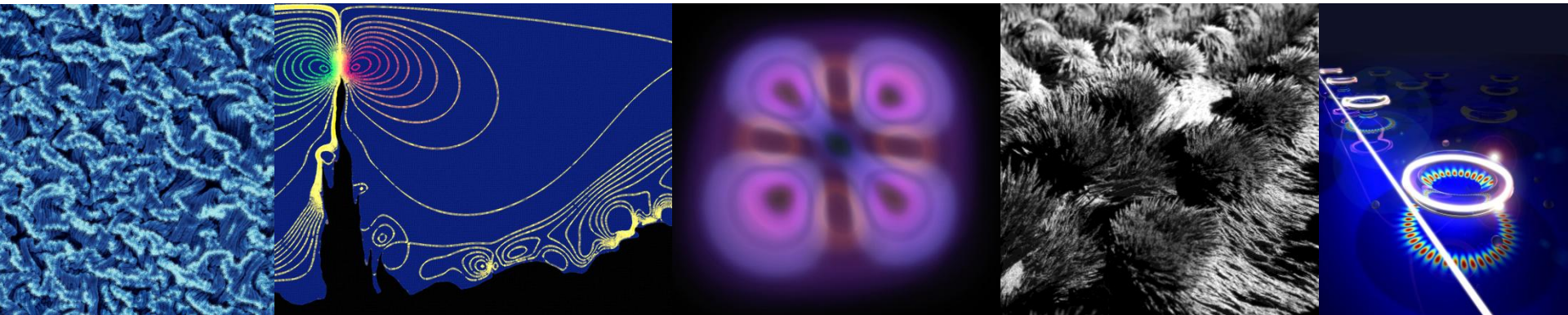
Fall 2012 ENG Advisory Committee Meeting Topics

- CBET COV
- CMMI COV
- NSF and ENG initiatives in response to strategic planning
  - Advanced manufacturing
  - Educating the next-generation engineers
  - Neuroscience and engineering



Introduction to Strategic Activities Directorate for Engineering

Thomas W. Peterson
Assistant Director for Engineering
October 17, 2012



Advanced Manufacturing

National initiatives

- Advanced Manufacturing Partnership
  - National Robotics Initiative
  - Materials Genome Initiative
- National Manufacturing Institutes
  - Pilot institute for the National Network for Manufacturing Innovation (NNMI)

CMU

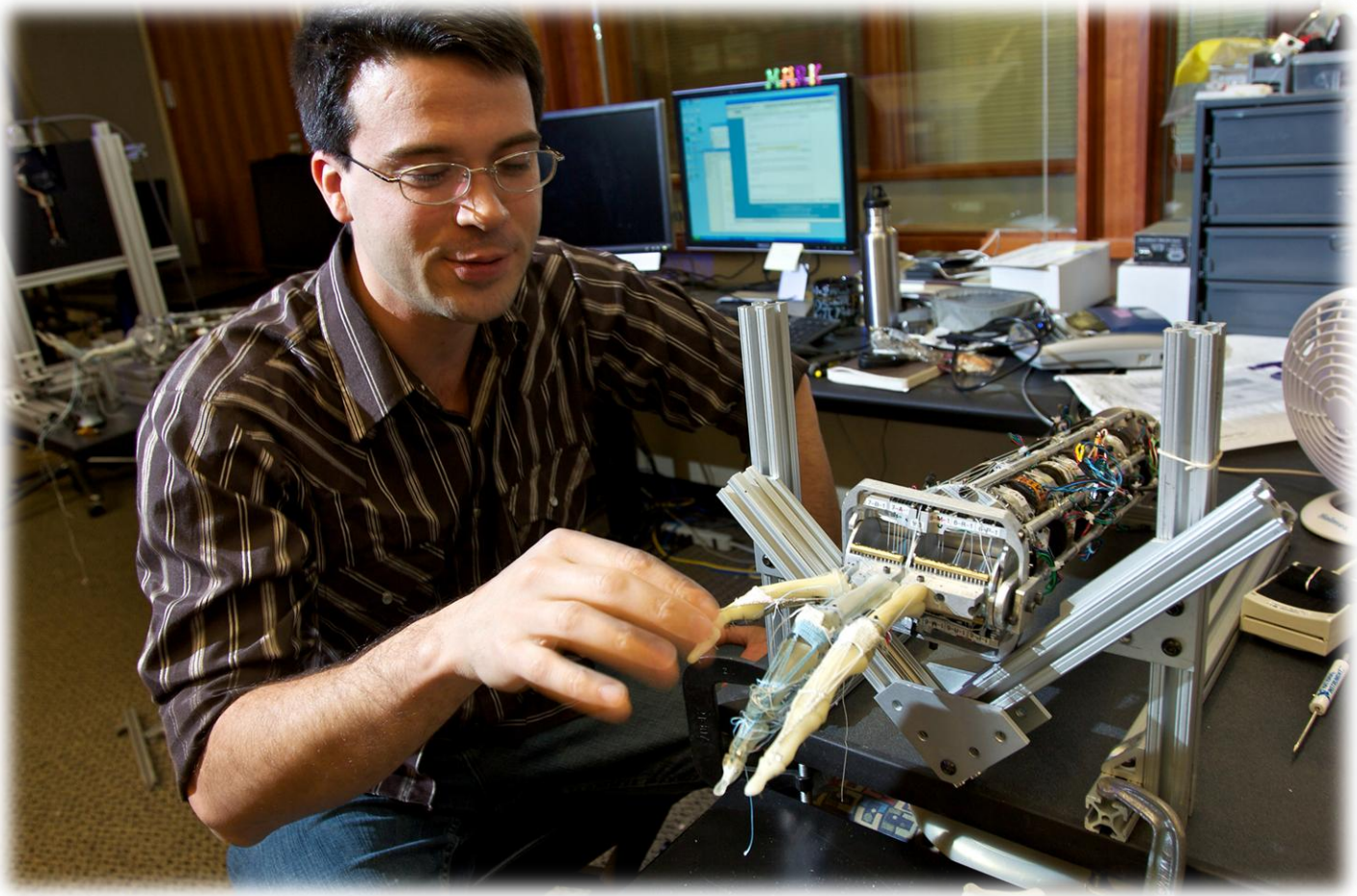
Rolls Royce

Engineering Education

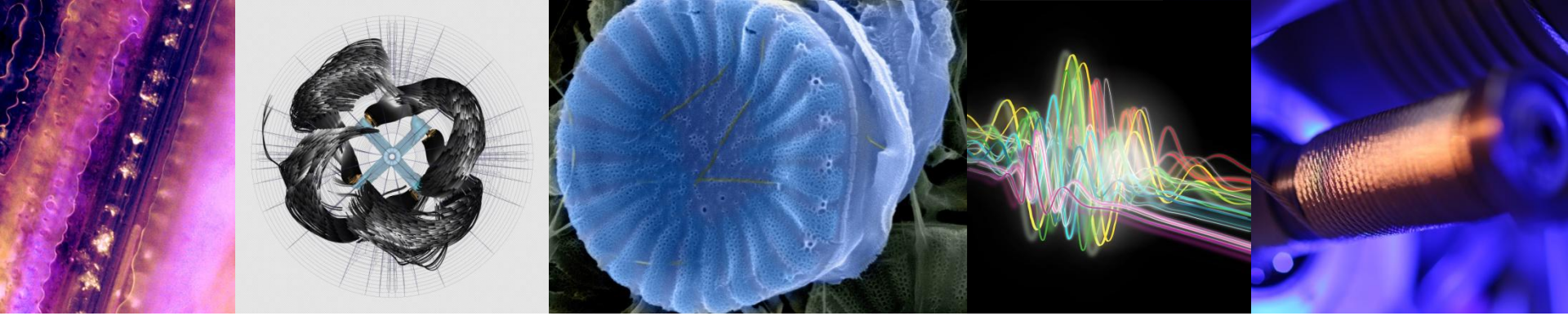
- White House Jobs Council
  - Initiative led by Paul Otellini, CEO of Intel
- STEP solicitation has a track for retention in engineering and computer science programs

Credit: Andrew Markeley, University of Wisconsin-Madison

Neuroscience and Engineering

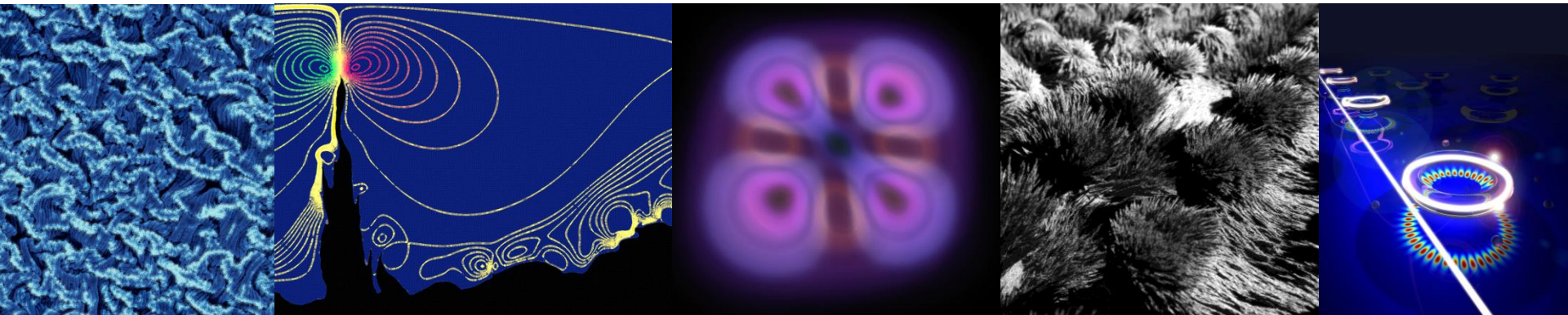


Credit: Yoky Matsuoka, University of Washington



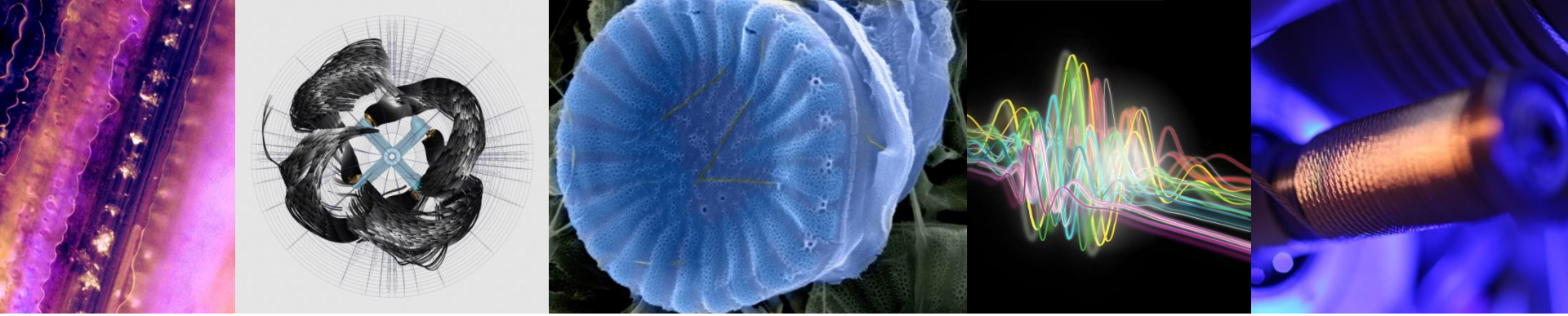
Directorate for Engineering Strategic Activities

Thomas W. Peterson
Assistant Director for Engineering
October 17, 2012

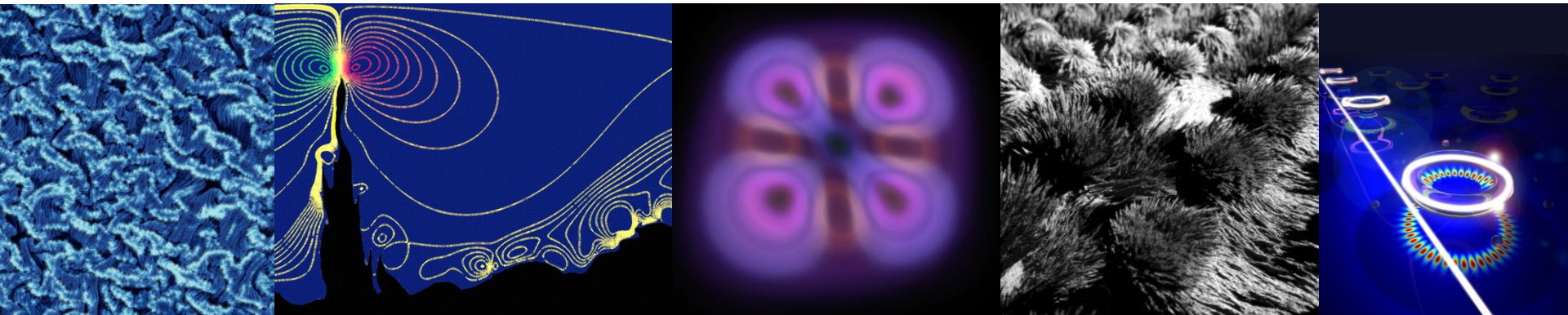


ENG Strategic Activities

- ENG investments
- International engagement
- Organizational changes
- FY 2013 budget

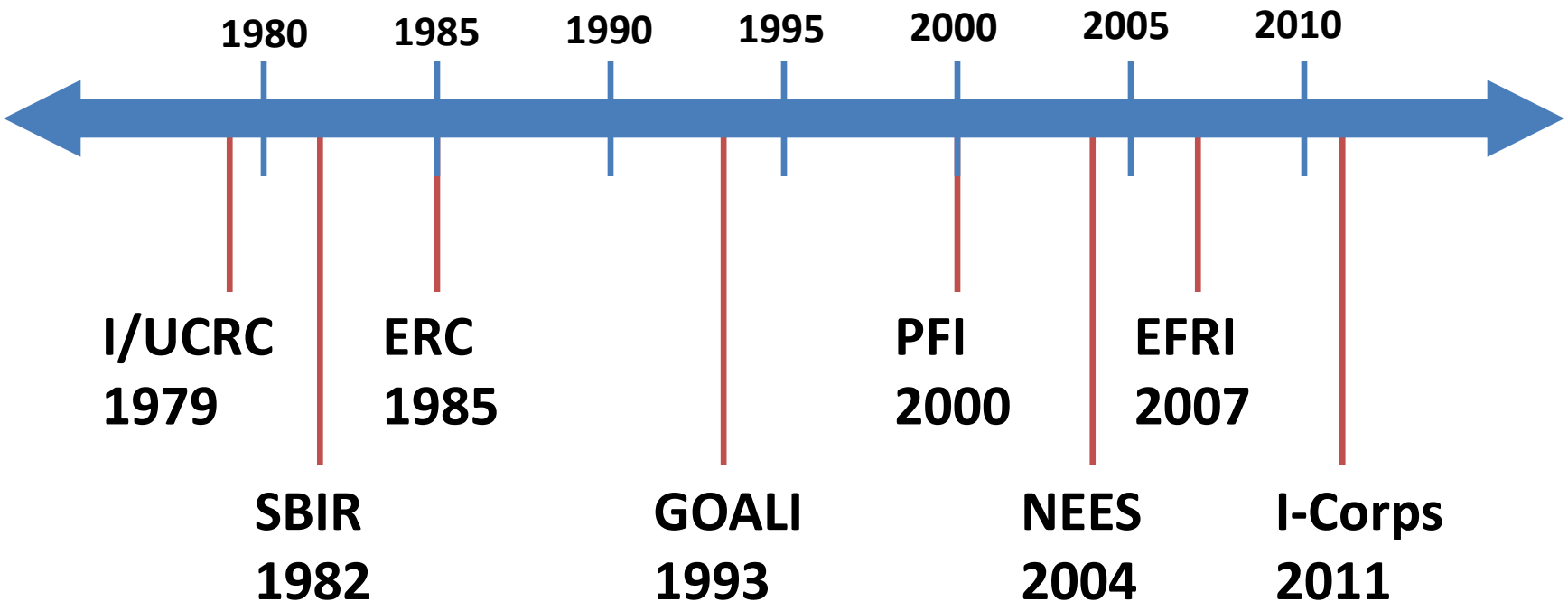


ENG Investments

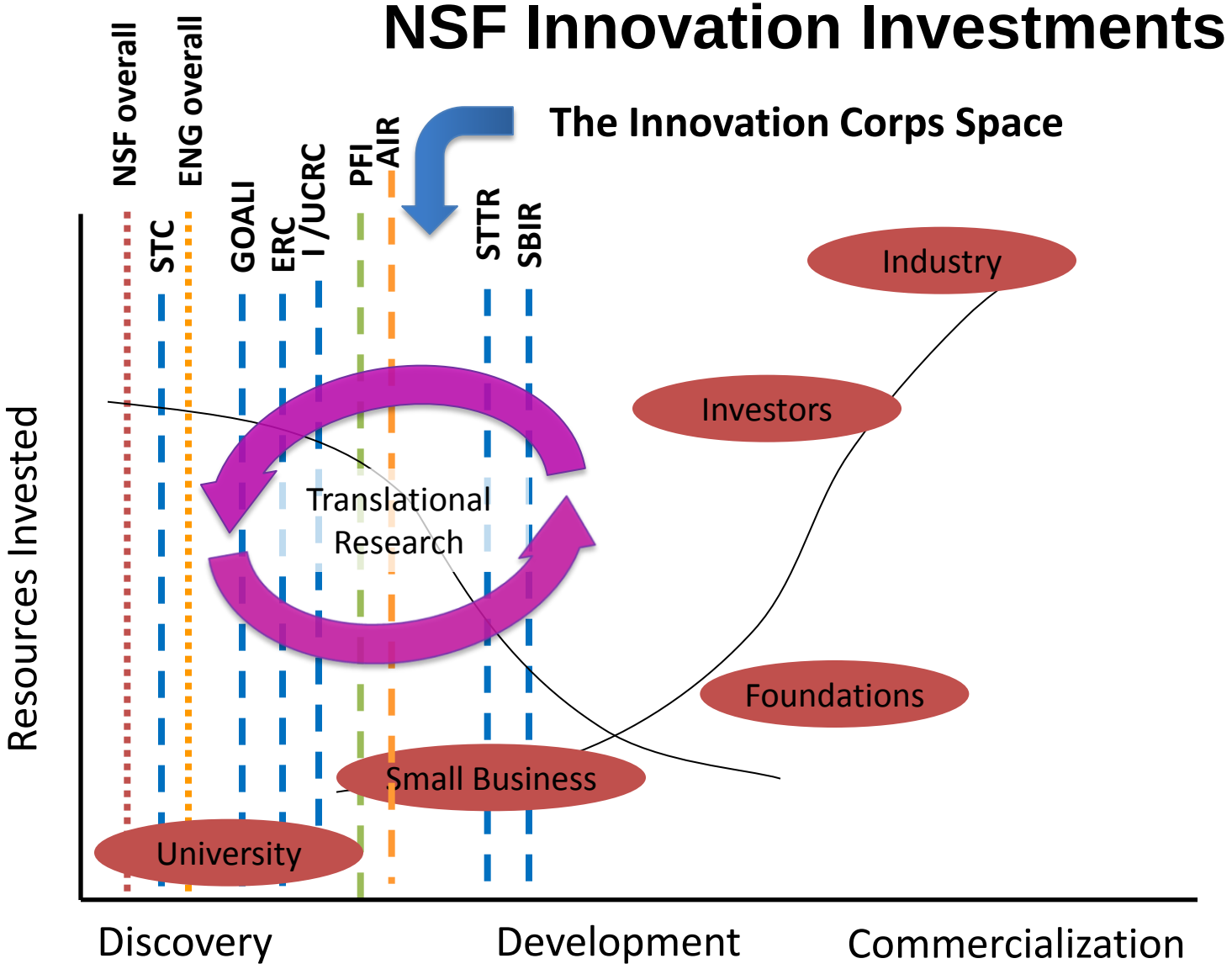



NSF
I-CORPS
NSF Innovation Corps

Programmatic Innovation



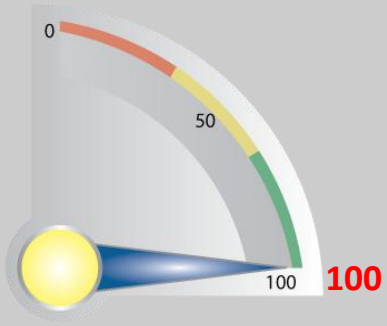
NSF Innovation Investments



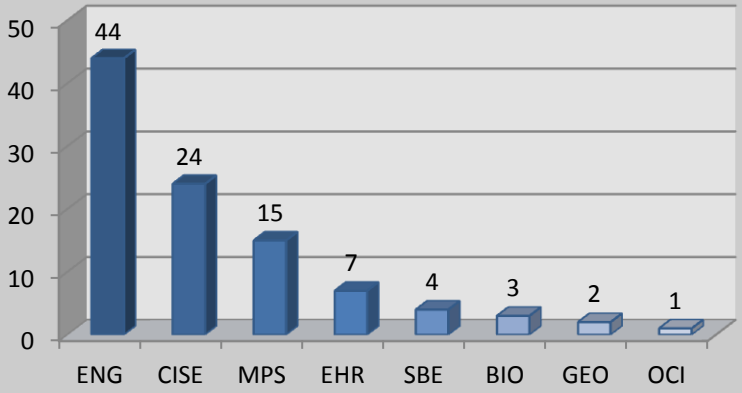
NSF I-Corps Program Dashboard

Cohorts 1-4, 7/18/12

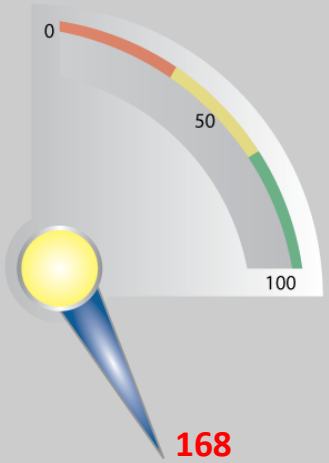
Awards



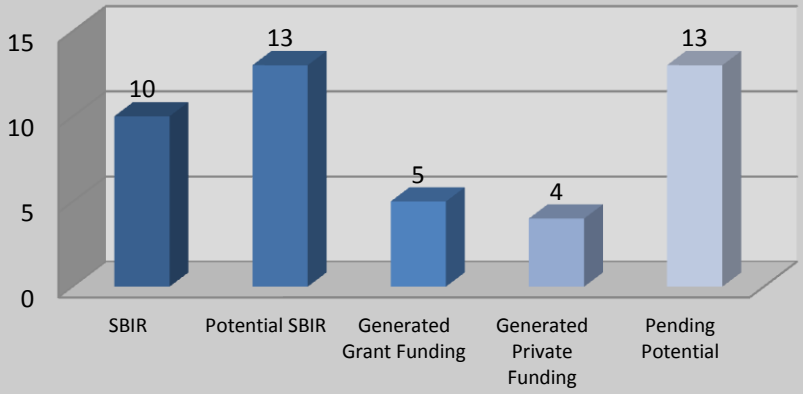
Directorates Represented



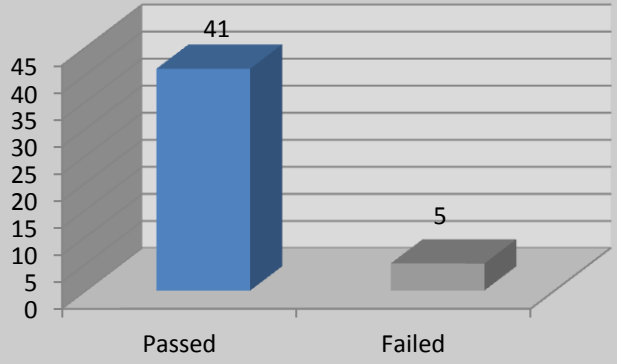
Mentors



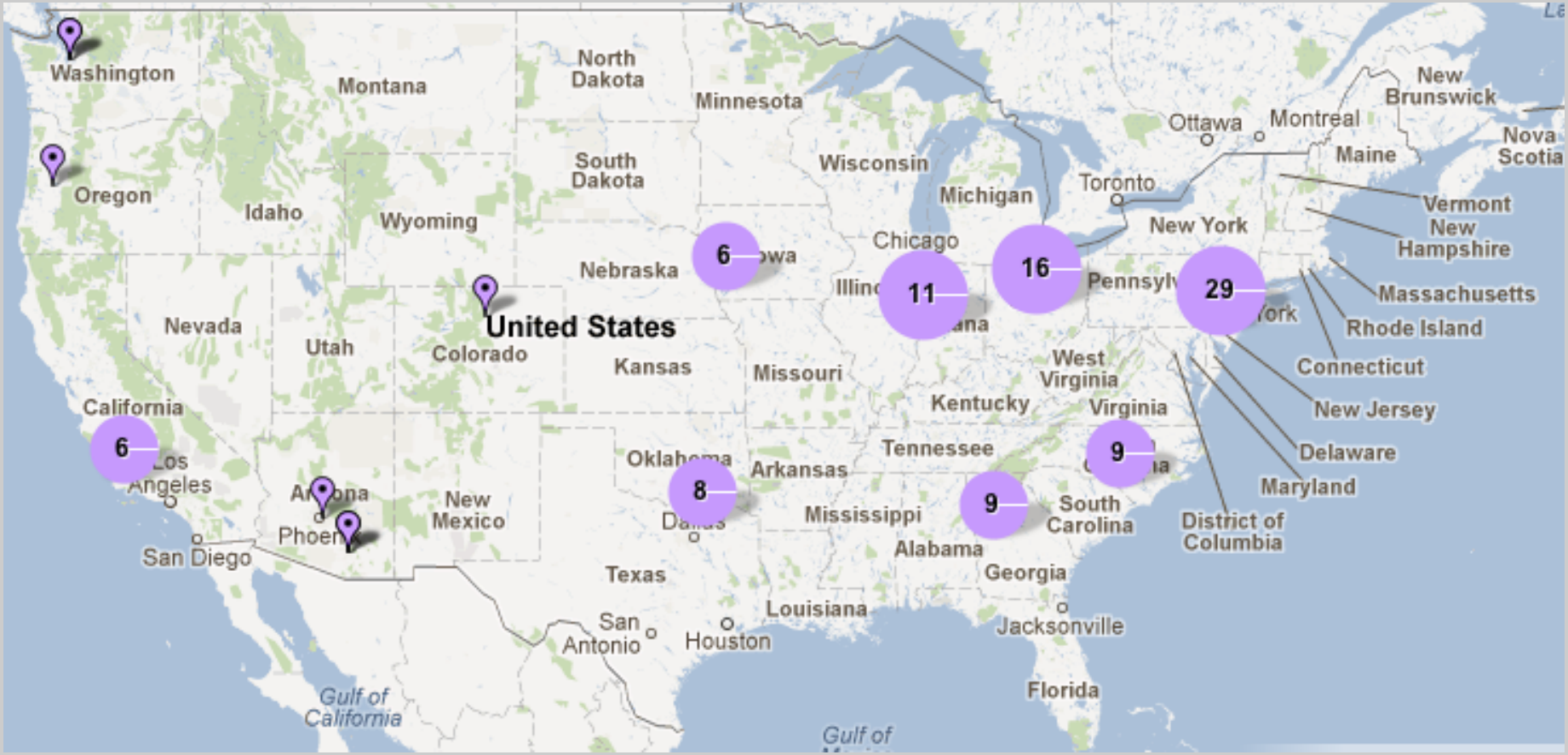
Additional Funding Proposals



Successfully Completed Curriculum

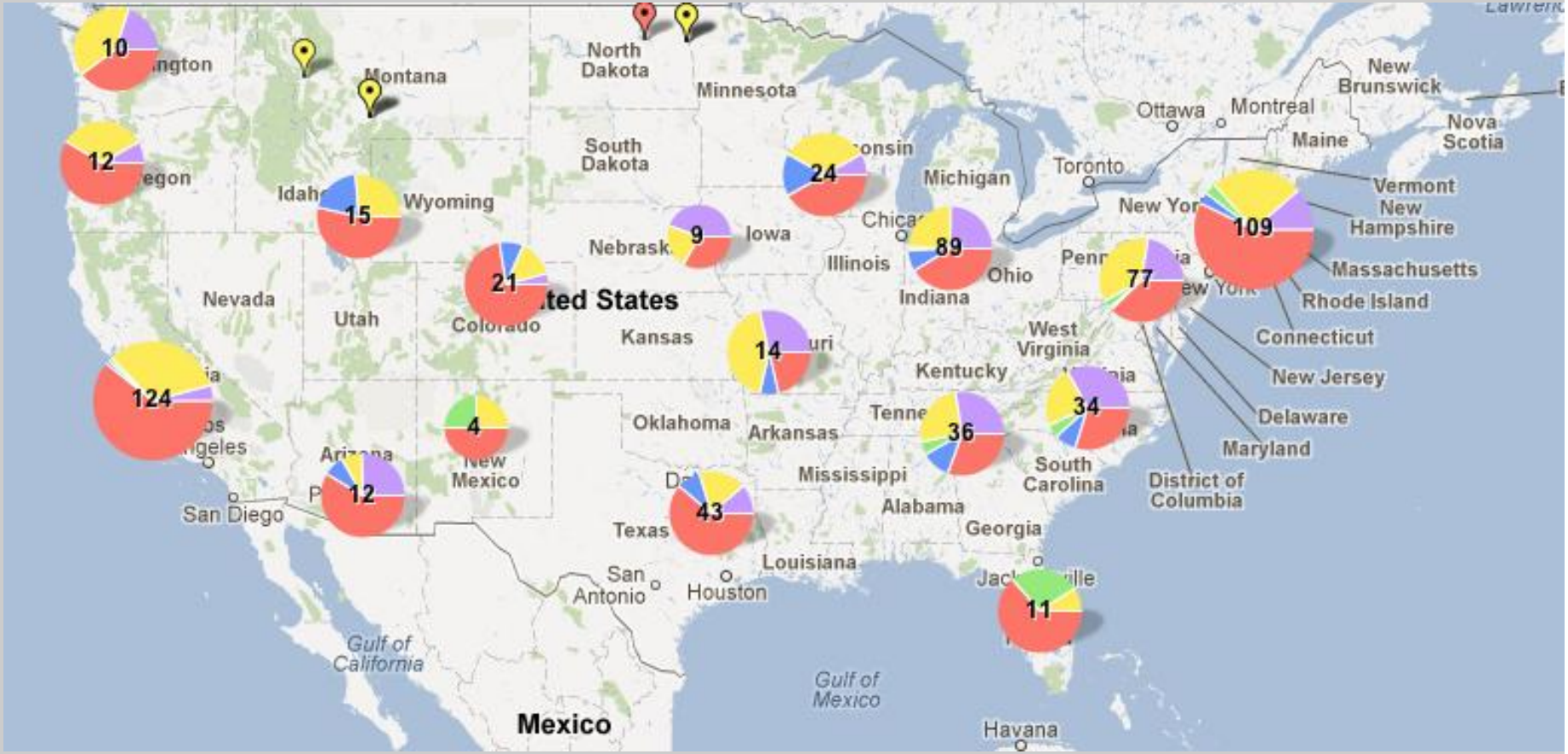


I-Corps Awards as of July 16, 2012 Showing Cohorts 1-4



All I-Corps Awards as of July 16, 2012. Active Awards and Recently Completed Awards.

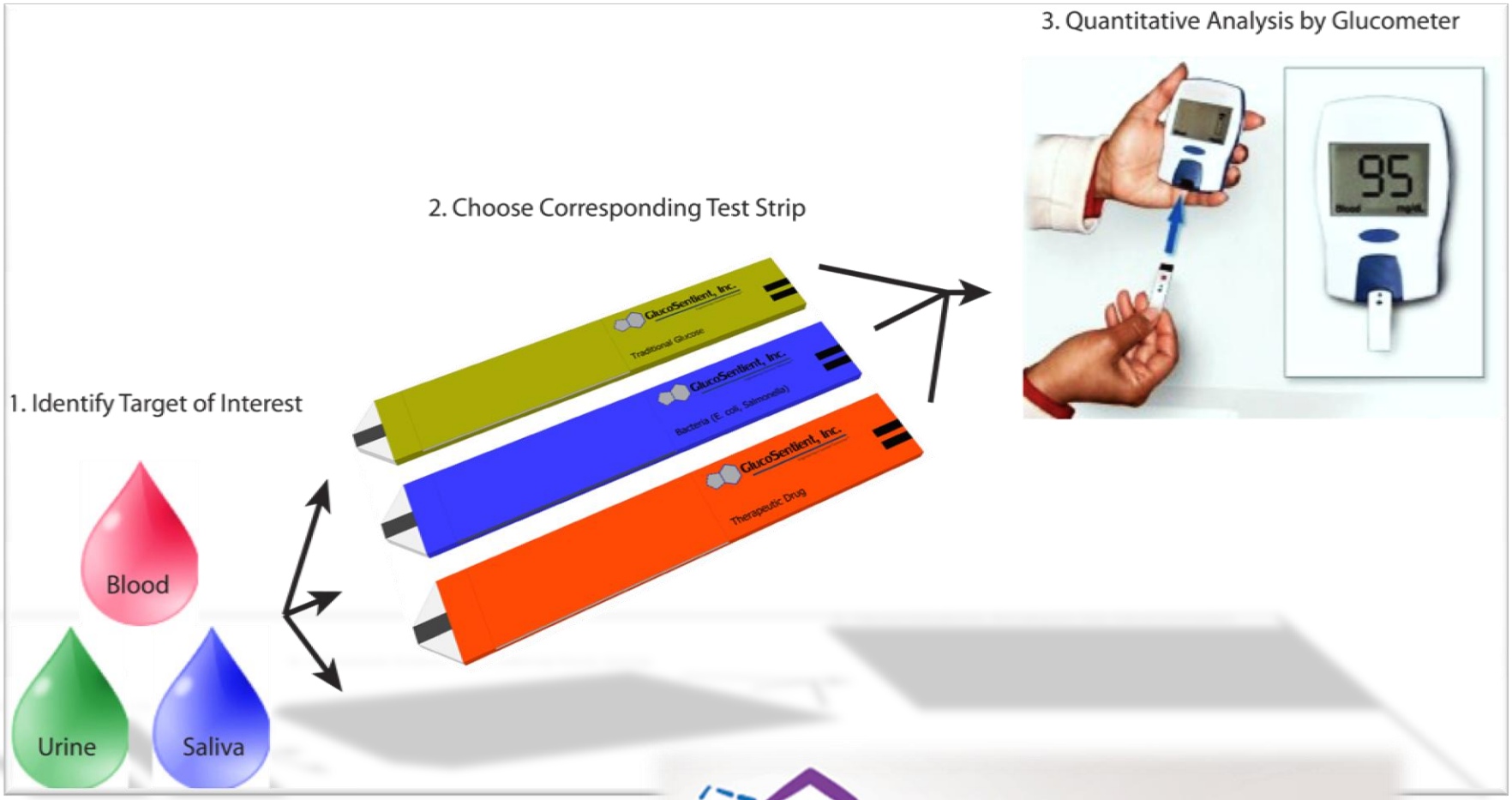
Leveraging the I-Corps Network: Optimal Network Nodes



Program SBIR Phase II STTR Phase II STTR Phase I SBIR Phase I I-Corps

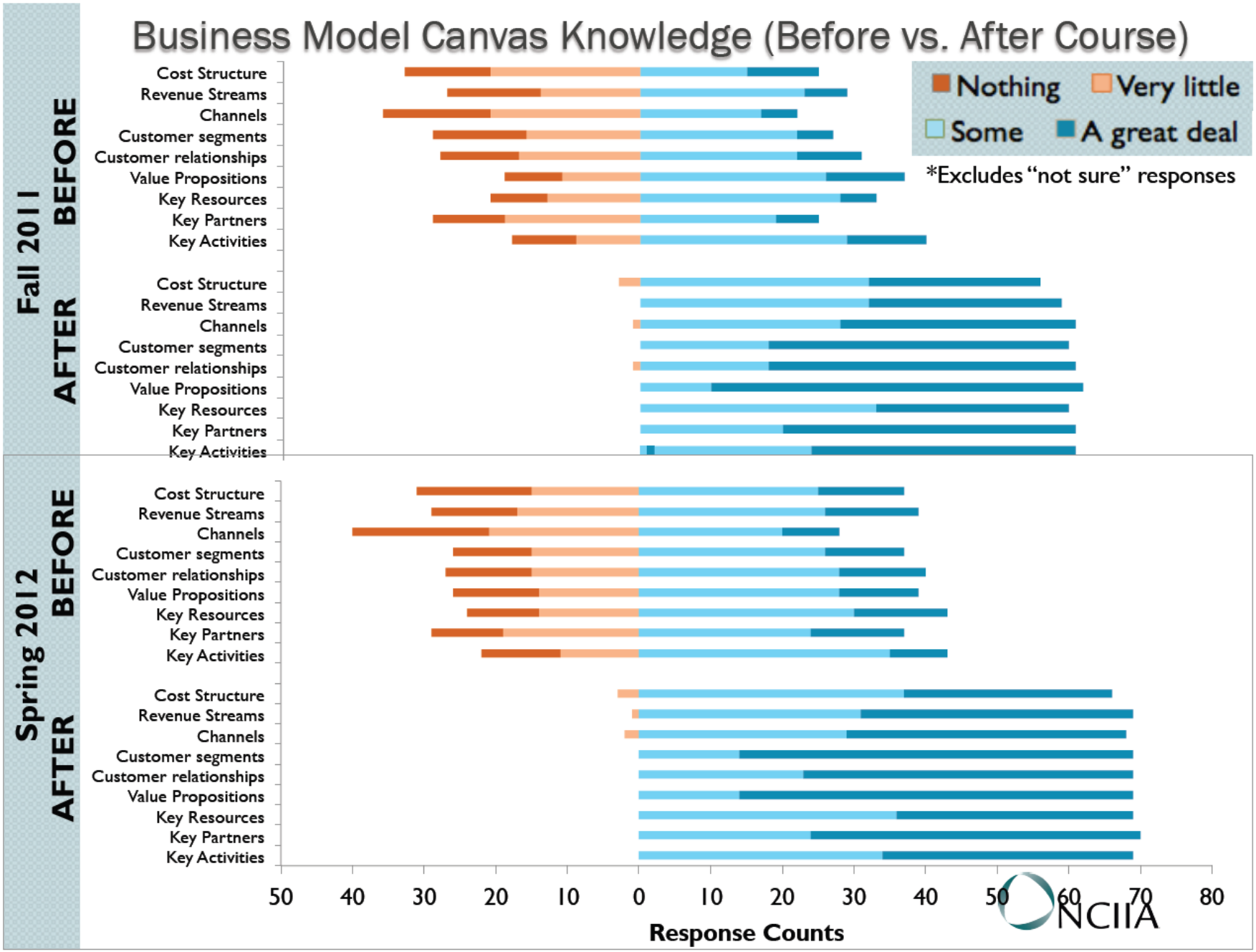
Active SBIR/STTR Awards as of July 16, 2012 and All I-Corps Awards

Innovation Corps Successes



GlucoSentient, Inc.

Business Model Canvas Knowledge (Before vs. After Course)



Flexible Bioelectronics Systems (BioFlex)
FY 2012 EFRI Awards

- Screening for the subtle signs of cancer
  - Vadim Backman of Northwestern University
- Smart wound dressing
  - Khademhosseini of the Brigham and Women's Hospital
- Safely absorbable electronics
  - Michel Maharbiz of the University of California-Berkeley
- Rapid ID of toxins and bacteria
  - Lev Perelman at Beth Israel Deaconess Medical Center

Credit: J. Rogers, University of Illinois

Origami Design (ODISSEI)
FY 2012 EFRI Awards

- Responsive structures
  - Mary Frecker of Pennsylvania State University
- Printing hinges onto polymers
  - Jan Genzer of North Carolina State University
- Shaping engineered systems
  - Larry Howell of Brigham Young University
- Synthesizing complex structures
  - Richard Malak of Texas A&M University
- Photo-origami
  - Hang (Jerry) Qi of the University of Colorado Boulder

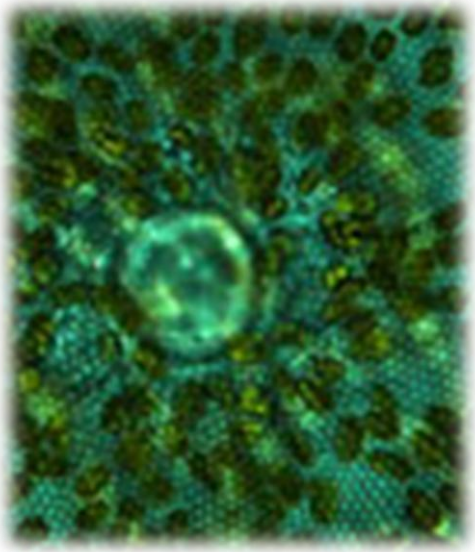
Origami Design (ODISSEI)
FY 2012 EFRI Awards

- Multi-functional origami systems
  - Daniela Rus of the Massachusetts Institute of Technology
- Tunable mechanics for self-folding
  - Christian Santangelo of the University of Massachusetts Amherst
- How size shapes folding
  - Max Shtein of the University of Michigan

Credit: Daniela Rus, MIT

Photosynthetic Biorefineries (PSBR)
FY 2012 EFRI Awards

- Micro-laboratory for microalgae
  - Arum Han of Texas A&M University
- Wastewater to chemical commodities
  - Brian Pfleger of the University of Wisconsin-Madison
- Direction for diatom production
  - Gregory Rorrer of Oregon State University



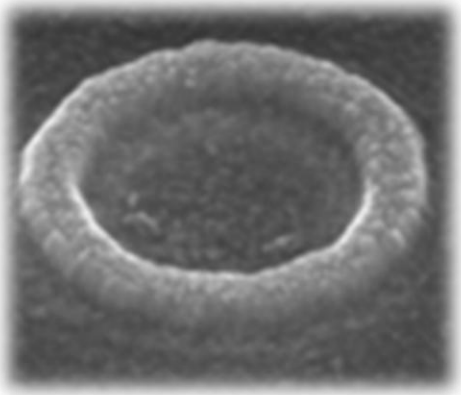
Credit: Rorrer Laboratory, Oregon State University

EFRI in FY 2013 and 2014

- FY 2013 Topics
  - Flexible Bioelectronics Systems (BioFlex)
  - Origami Design for Integration of Self-assembling Systems for Engineering Innovation (ODISSEI)
  - Photosynthetic Biorefineries (PSBR)
- FY 2014 Topics
  - Received ~150 topic ideas via website
  - Planning presentations of select ideas, with external input

Nanosystems ERCs

- NSF Nanosystems ERC for Advanced Self-Powered Systems of Integrated Sensors and Technology (ASSIST)
- NSF Nanosystems ERC for Nanomanufacturing Systems for Mobile Computing and Mobile Energy Technologies (NASCENT)
- NSF Nanosystems ERC for Translational Applications of Nanoscale Multiferroic Systems (TANMS)


Credits, L to R: Marc Hall, NCSU; Joshua Leon Hockel, Mechanical and Aerospace Engineering, UCLA; Cockrell School of Engineering, University of Texas at Austin

Nanotechnology Infrastructure

- Network for Computational Nanotechnology (NCN)
  - Cyber Platform
  - NanoBIO Node
  - Nano-Engineered Electronic Device Simulation (NEEDS) Node
- National Nanotechnology Infrastructure Network (NNIN)
  - FY 2013 represents year ten of this planned ten-year investment.

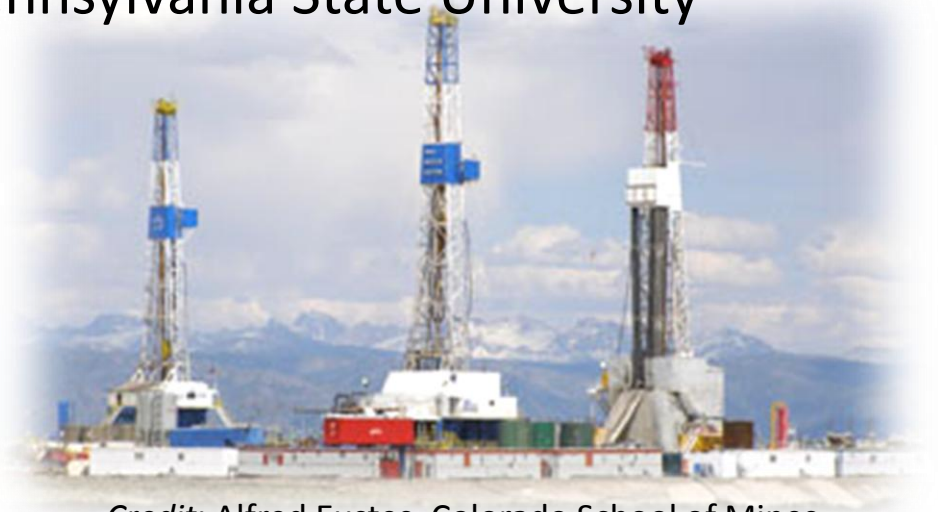
Earthquake Engineering Infrastructure and Research

- Re-competition of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES)
  - Hub remains key to research community
  - Overall support remains level
  - Rebalance between facilities and research

Credit: Courtesy NEES

New Sustainability Research Networks (SRNs)

- NSF SEES SRN: Natural Gas Development and its Effects on Air and Water Resources
  - Led by the University of Colorado, Boulder
- NSF SEES SRN: Sustainable Climate Risk Management Strategies
  - Led by Pennsylvania State University

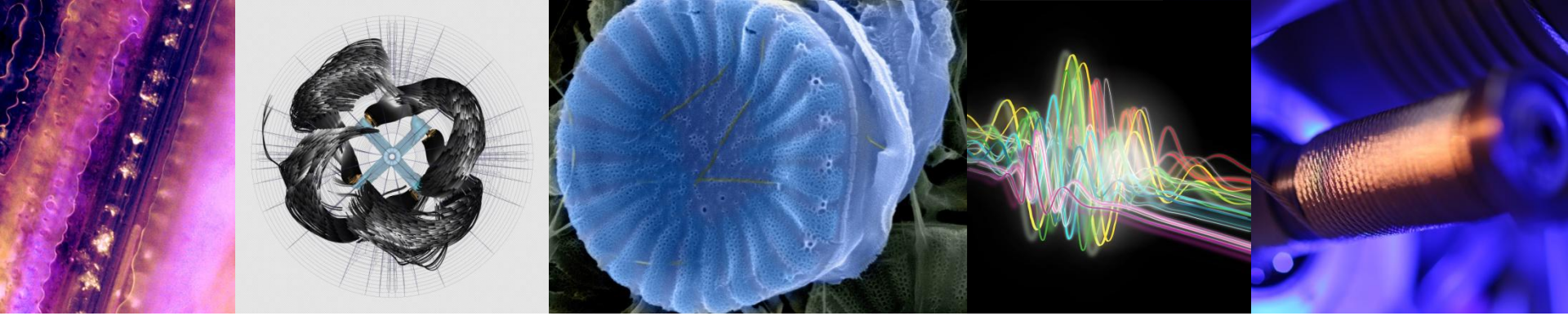


Credit: Alfred Eustes, Colorado School of Mines

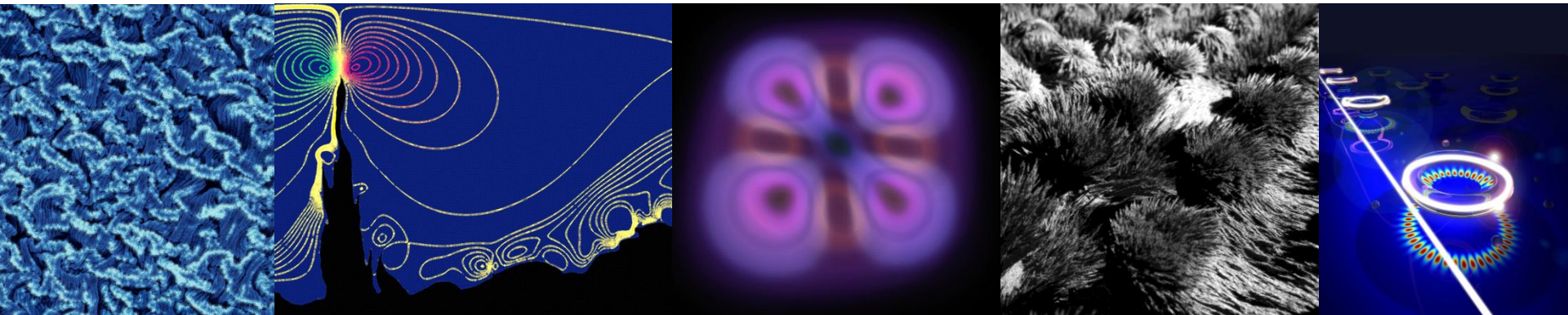
Optics and Photonics

- 2012 – NRC issued **Optics and Photonics: Essential Technologies for Our Nation**
- 2010 – ECCS award to National Academies
- 1998 – NRC issued **Harnessing Light: Optical Science and Engineering for the 21st Century**

Credit: *Integrated Photonics Inc.*



International Engagement



Global Research Council

- Global Summit on Merit Review, May 2012
  - Heads of research councils from G-20 and OECD countries gathered at NSF to identify common principles and facilitate collaboration.
  - They released of a common set of merit review principles—expert assessment, transparency, impartiality, appropriateness, confidentiality, and integrity and ethical considerations
- Global Summit , May 2013
  - The next Summit, which will be co-hosted by Brazil and Germany in Berlin, will tackle core principles of research integrity and agree on an implementation plan for Open Access to Publications
- http://www.globalresearchcouncil.org/

Joint Commission Meetings in 2012

- U.S.-Brazil Bilateral Joint Commission Meeting on Science and Technology Cooperation, March 12-13
  - Emphasis on 1) innovation; 2) prevention and mitigation of natural disasters; 3) ocean science, technology and observatories, and 4) measurement standards
- U.S.-Turkey Bilateral Joint Commission Meeting on Science and Technology Cooperation, November 1-2
  - Emphasis on 1) engineering for a sustainable future, 2) energy research, 3) biomedical research, 4) material sciences, 5) innovative technologies in agricultural research, 6) cyber learning, and 7) natural hazards, with an emphasis on seismology

Collaboration with Europe

- Ireland
- Engineering and Physical Sciences Research Council (EPSRC), UK
  - Grand Challenges for Engineering Summit
- G8-Heads of Research Councils (HORCs)

Science Across Virtual Institutes (SAVI)

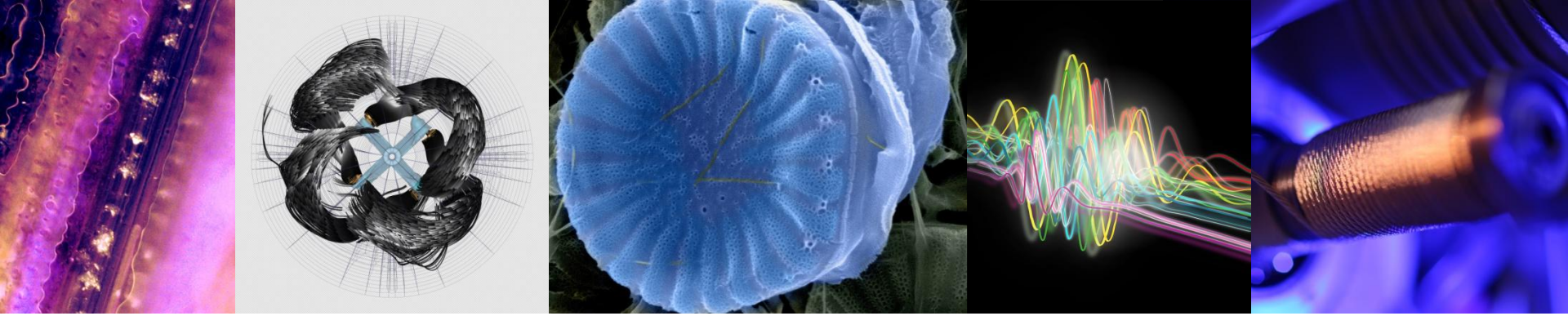
- The virtual institutes will serve as catalysts to foster many STEM activities efficiently and economically, and will provide a mechanism for U.S. research communities to build long-term, structured collaborations with partnering countries
- Workshop and SAVI EAGER award to explore Engineering Education collaboration with Finland

CAREER

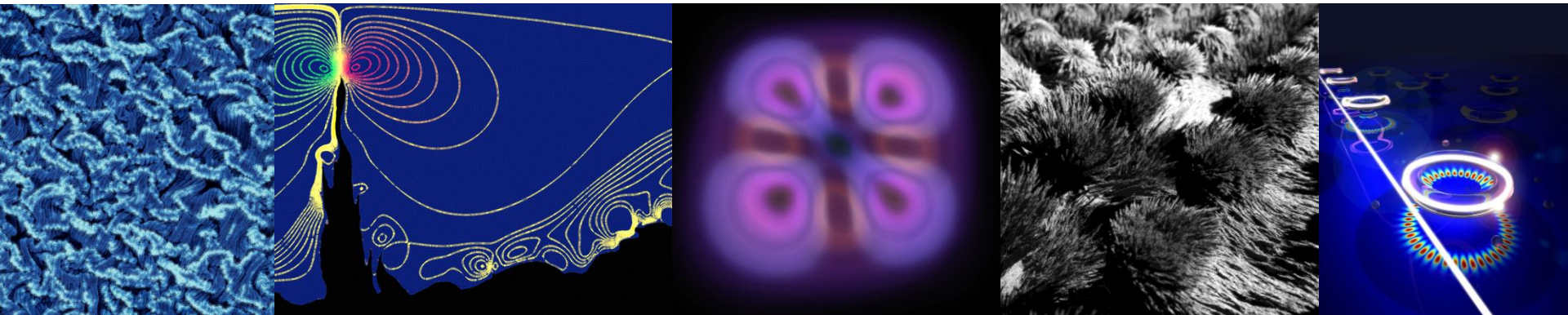
- Forward-looking program review is led by Pat Farrell, ENG Advisory Committee member
- NSF CAREER Coordinating Committee chair is Theresa Maldonado, ENG/EEC Division Director
- CAREER awardees have a new supplement opportunity to collaborate with researchers supported by the European Research Council

European Research Council

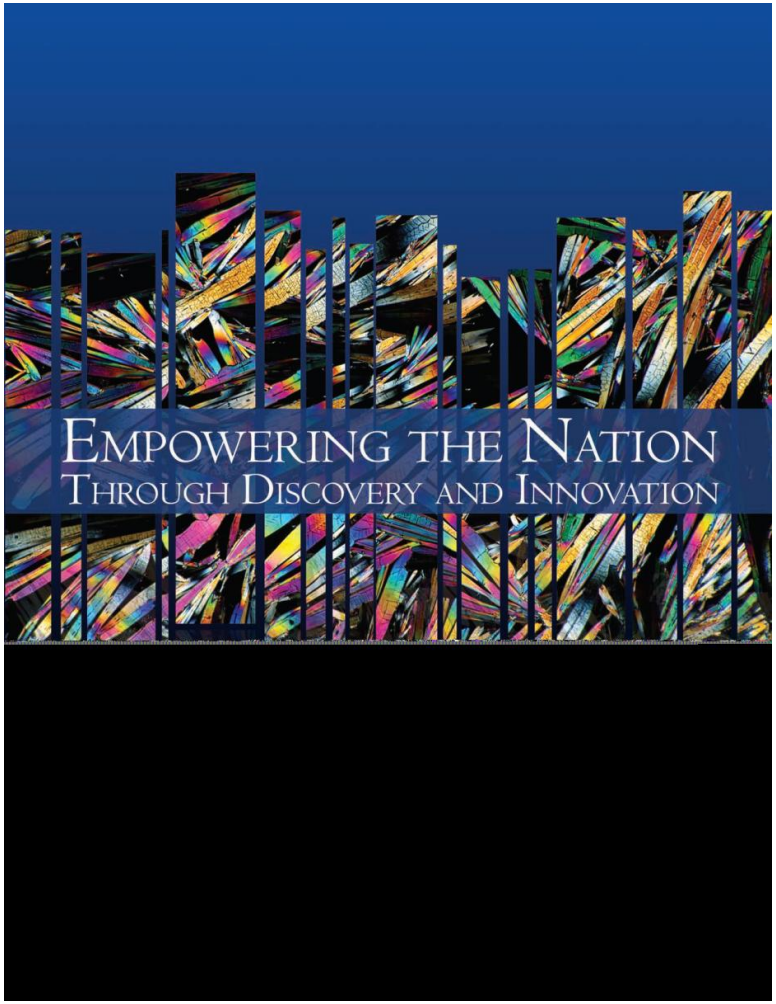
Established by the European Commission



Organizational Changes



NSF Strategic Planning



- NSF is beginning to prepare a new strategic plan.
  - A 5-year plan is required every 3 years.
- Led by Joe Dehmer, former Physics DD, the DAD/EO group is starting work on it.
- A draft will be shared with AdComs in the spring, as well as NSB and NSF employees.
- The NSF draft must go to OMB by June 3.

Changes in the Office of the Director

- The ***Office of Cyberinfrastructure*** will become a division within the Directorate for Computer and Information Science and Engineering.
- The ***Office of International Science and Engineering*** will be merged with the ***Office of Integrative Activities***, and the combined unit will become the Office of International and Integrative Activities.
- The ***Office of Polar Programs*** will become a division within the Directorate for Geosciences.

Merit Review Process

- Virtual panel configurations
- Pilots
  - CISE: Panel conducts asynchronous pre-screening of proposals during online, moderated discussion
  - ENG: Proposing PIs review other proposals submitted to their window; based on game theory
  - SBE: Select PIs declined in one window are invited to submit revised proposals to a special, second window

Evaluation and Assessment in NSF and within ENG

- Foundation-wide effort
- Strong interest by OMB
- ENG and EHR have been lead directorates historically
- Alexandra Medina-Borja PD for E&A

I-CORPS LONG-TERM LOGIC MODEL

INPUTS

Funding and Logistics

Resources to help determine the readiness to transition technology

Education program and materials

Learn Start Up Model

Process, Materials and Resources

Descriptions of the potential commercial impact.

Other coordinating entities

PROJECT ACTIVITIES

NSF-funded researchers working on projects that are conducive to attract subsequent third party commercial interest are identified and PI teams participate in the program

- Applicant teams are interviewed
- I-Corps teams are trained to understand innovation and entrepreneurship
- I-Corps teams engage in direct customer feedback, modify end use as necessary.
- I-Corps teams share all experiences to learn from each other
- Technology demonstrations are made for potential partners

OUTPUTS AND IMMEDIATE OUTCOME

Participants graduate from the program and become competitive entrepreneurially

Viability of products and services is determined

- I-Corps teams complete the course and are satisfied with its content and quality
- Participants experience an increase in knowledge and change in attitude, perceptions and behaviors regarding innovation, commercialization and entrepreneurship
- A clear go/no go decision regarding viability of products and services
- A transition plan and a business plan suitable for review by third-party investors is prepared for pertinent projects

INTERMEDIATE OUTCOME

I-Corps program spurs translation of fundamental research

- A sub-set of I-Corps teams initiate start-up businesses
- A sub-set of I-Corps teams license their products/services to third-parties
- A sub-set of I-Corps teams submit SBIR proposals
- Collaborations between academia and industry are formed

LONG-TERM OUTCOME OR IMPACT

Viable, innovative products and services created by I-Corps researchers reach in the market

- A sub-set of I-Corps teams raises private funding for commercialization
- Licensing revenues are generated
- Sales of new products or services are generated

Life of the award | Year 1 after the award | Years 2-5 after the award | Years 5-10 after the award

Evaluation & Assessment Progress since April 2012

Conceptual Framework

SBIR
- Logic model developed; indicators include IP licenses and jobs

EFRI
- Logic model developed; sample indicators include new fields

I-CORPS
- Logic model developed; sample indicators include the number of teams that initiate start-ups

Civil Infrastructure Systems
- Reverse outcome-development process for basic research tested

BRIGE
- Logic model development is informing the program's future

IT Infrastructure for Evaluation

Data migration to NSF's Enterprise Data Warehouse

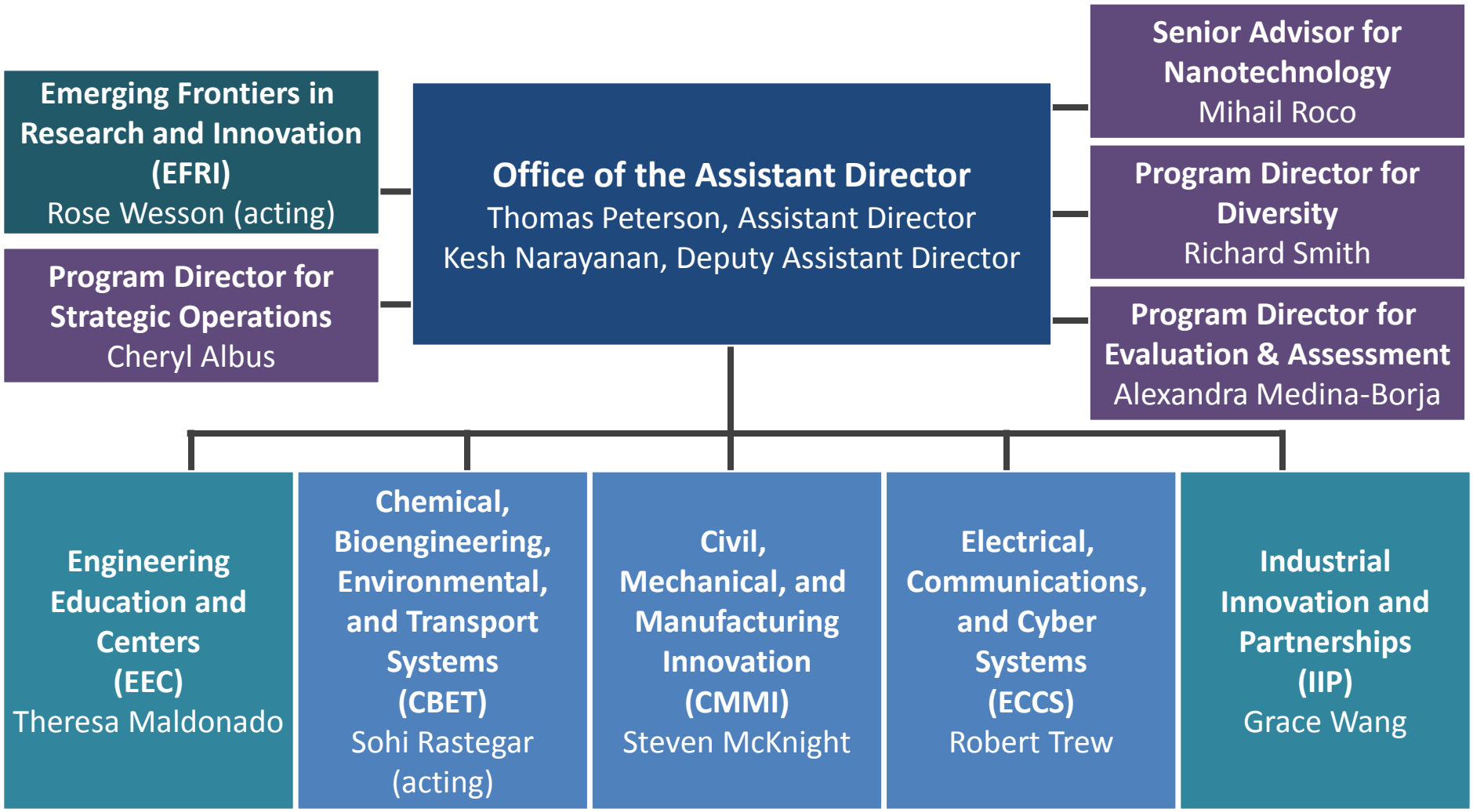
Design monitoring systems for EFRI

SBIR and I/UCRC outcome monitoring systems development

Broadening Participation

- Engagement across Engineering
  - ENG Diversity Working Group
  - Program Director for Diversity, Richard Smith
- Strategic planning underway

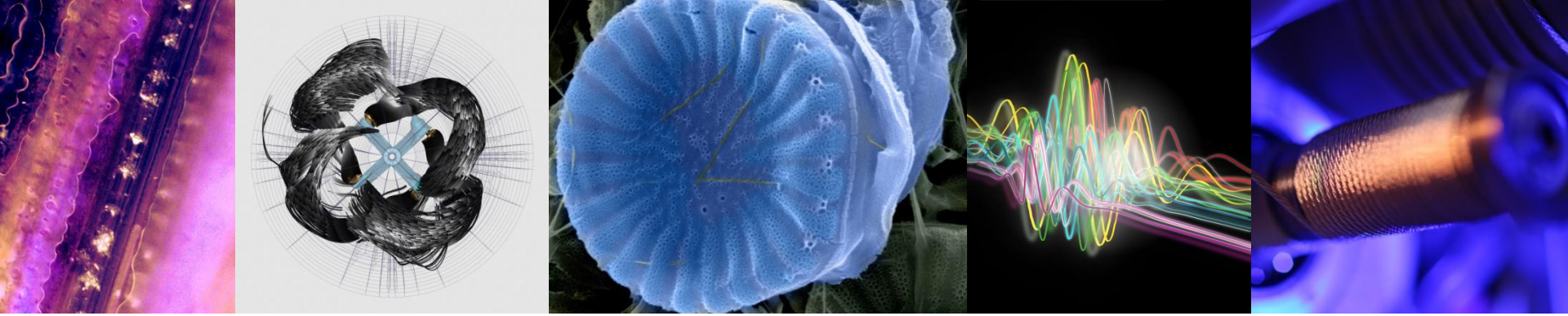
NSF Directorate for Engineering (ENG)



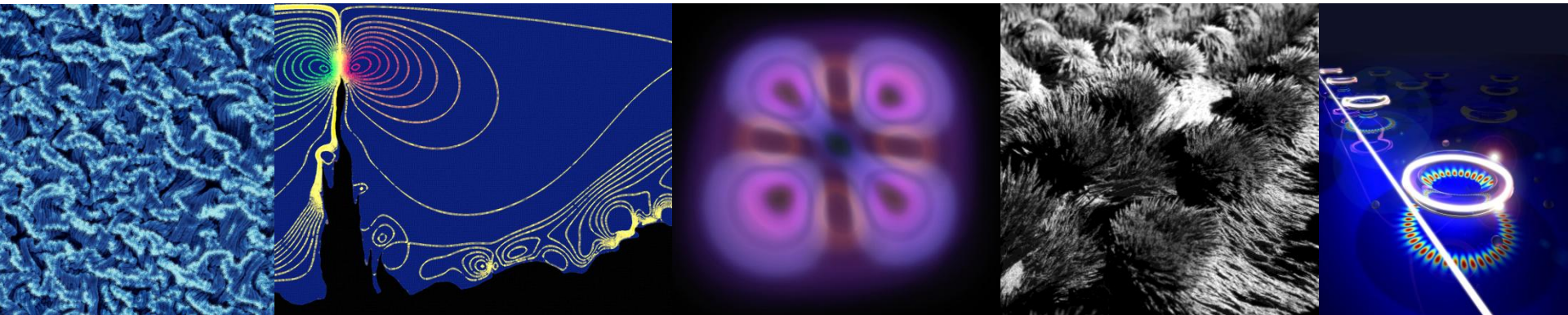
Open Recruitments

- ENG AD
- CBET Division Director
- ECCS Division Director

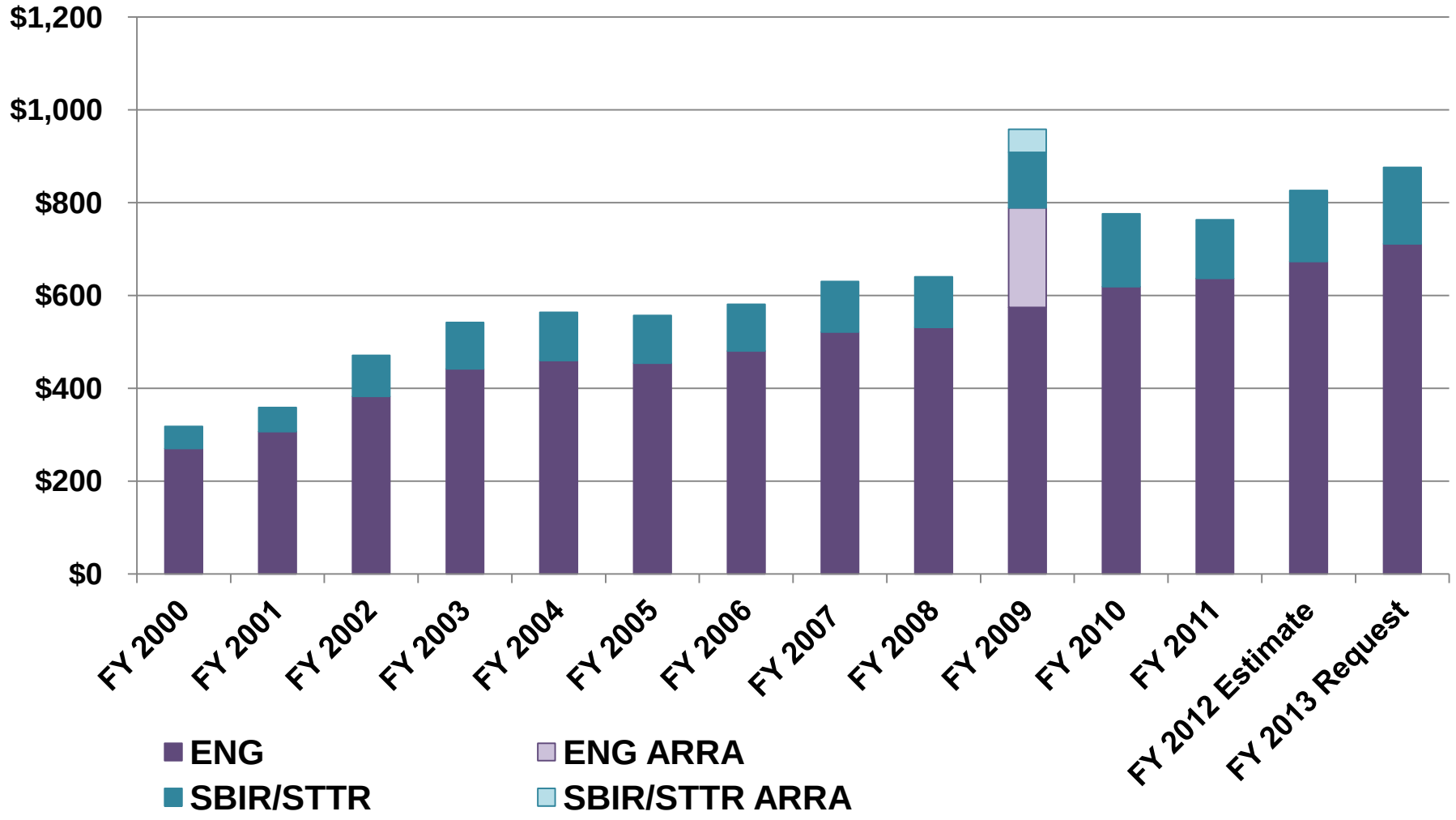
- CBET Program Directors
  - Biomedical Engineering
  - Biosensing
  - Catalysis and Biocatalysis
  - Fluid Dynamics
  - Interfacial Processes and Thermodynamics
- EEC Program Director
  - Engineering Education



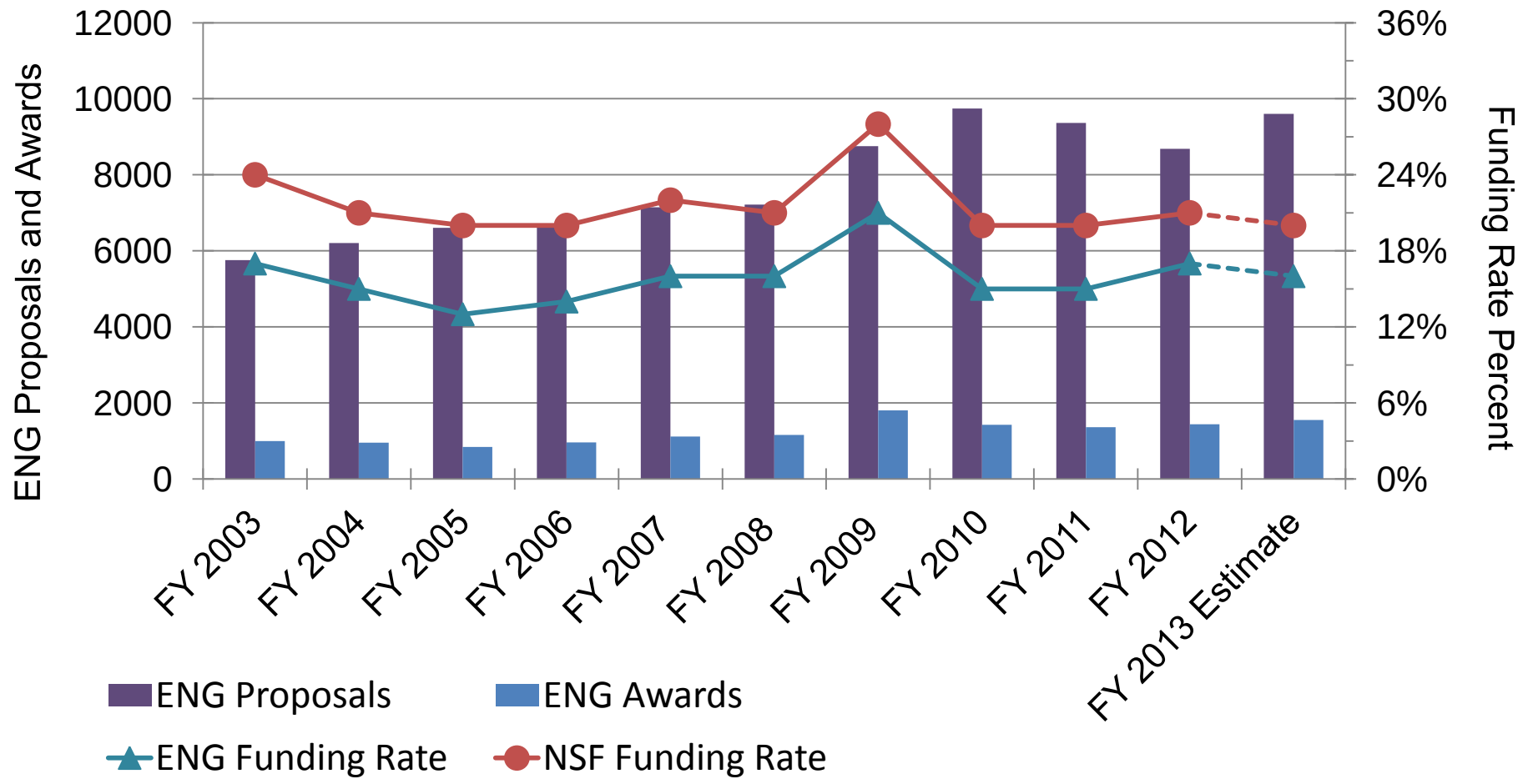
FY 2013 Budget



ENG and SBIR/STTR Budgets ($M)



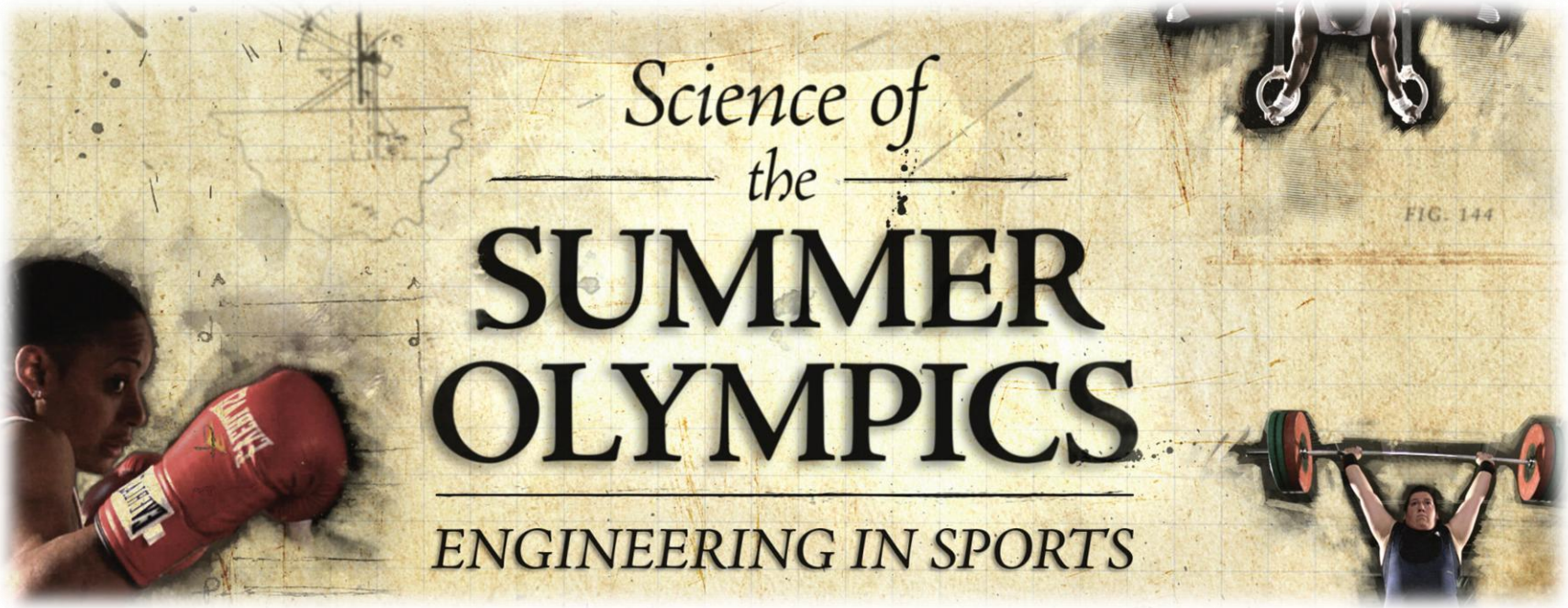
ENG and NSF Research Grant Proposals and Awards



NSF R&RA Budget ($M)

Directorate	FY 2011 Actual	FY 2012 Estimate	FY 2013 Request	FY 2013 Request Over:			
				FY 2011 Actual		FY 2012 Estimate	
				Amt	%	Amt	%
BIO	$712.27	$712.38	$733.86	$21.59	3%	$21.48	3.0%
CISE	636.06	653.59	709.72	73.66	12%	56.13	8.6%
ENG	763.33	826.17	876.33	113.00	15%	50.16	6.1%
ENG Programs	*636.86*	*673.41*	*711.13*	*74.27*	*12%*	*37.72*	*5.6%*
SBIR/STTR	*126.47*	*152.76*	*165.20*	*38.73*	*31%*	*12.44*	*8.1%*
GEO	885.32	885.27	906.44	21.12	2%	21.17	2.4%
MPS	1,312.42	1,308.94	1,345.18	32.76	2%	36.24	2.8%
SBE	247.33	254.25	259.55	12.22	5%	5.30	2.1%
OCI	300.75	211.64	218.27	-82.48	-27%	6.63	3.1%
OISE	49.03	49.85	51.28	2.25	5%	1.43	2.9%
OPP	440.70	435.87	449.74	9.04	2%	13.87	3.2%
IA	259.60	349.59	431.52	171.92	66%	81.93	23.4%
U.S. Arctic Res. Comm.	1.58	1.45	1.39	-0.19	-12%	-0.06	-4.1%
Research & Related Activities	$5,608.38	$5,689.00	$5,983.28	$374.90	6.7%	$294.28	5.2%


Science of
the
SUMMER
OLYMPICS
ENGINEERING IN SPORTS
LONDON 2012
NSF
NBC LEARN



OLPA Team

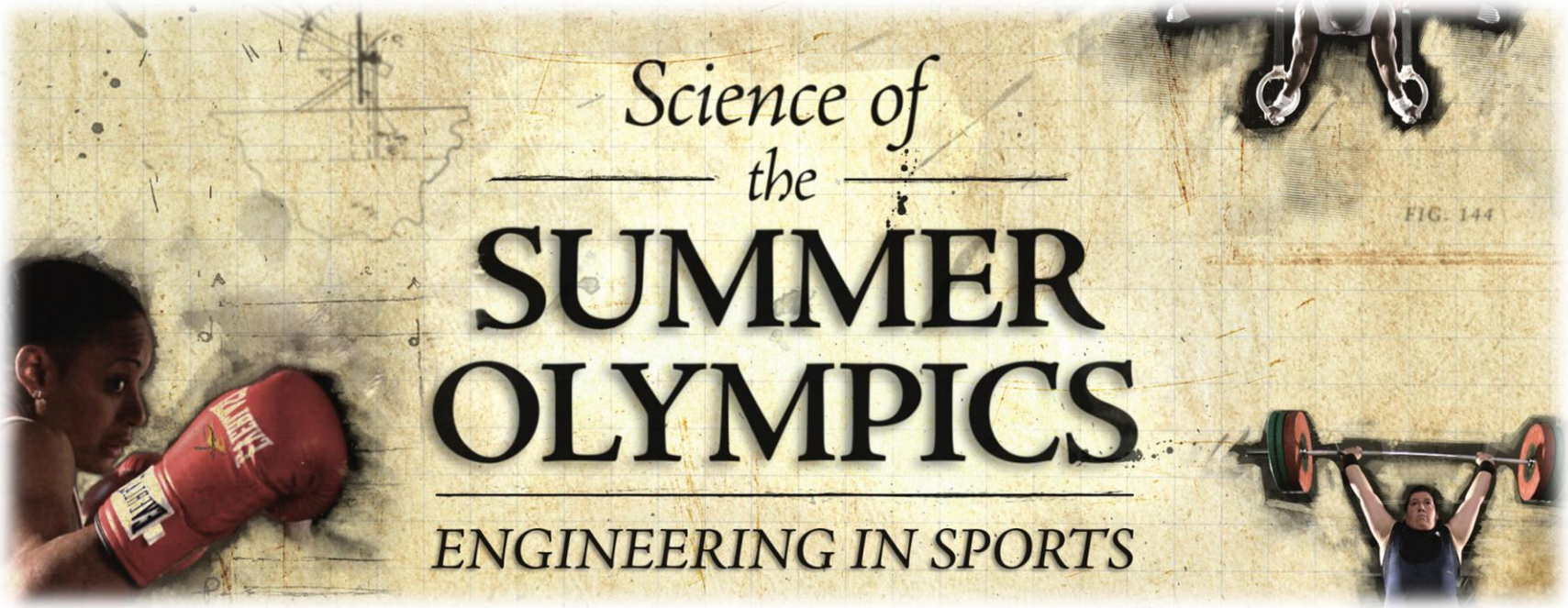
- Susan Mason, Karen Sandberg, and Zach Miller (External Affairs); Josh Chamot (Public Affairs); Zeke Kossover (Einstein Fellow)

Review Team

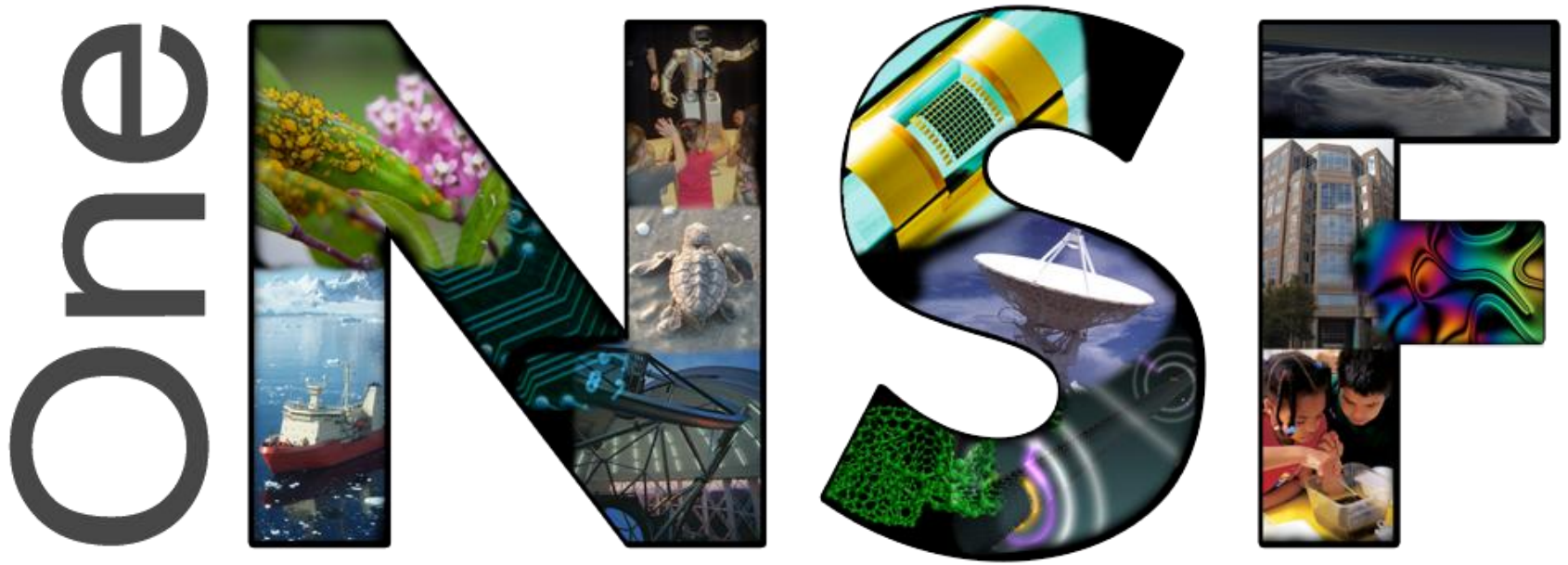
- ENG – Jessica Foley (AAAS Fellow); Larry Goldberg; Cecile Gonzalez; George Hazelrigg; Sue Kemnitzer; Sohi Rastegar; Don Senich
- EHR – Valentine Kass, David Campbell, Remy Dou (Einstein Fellow)

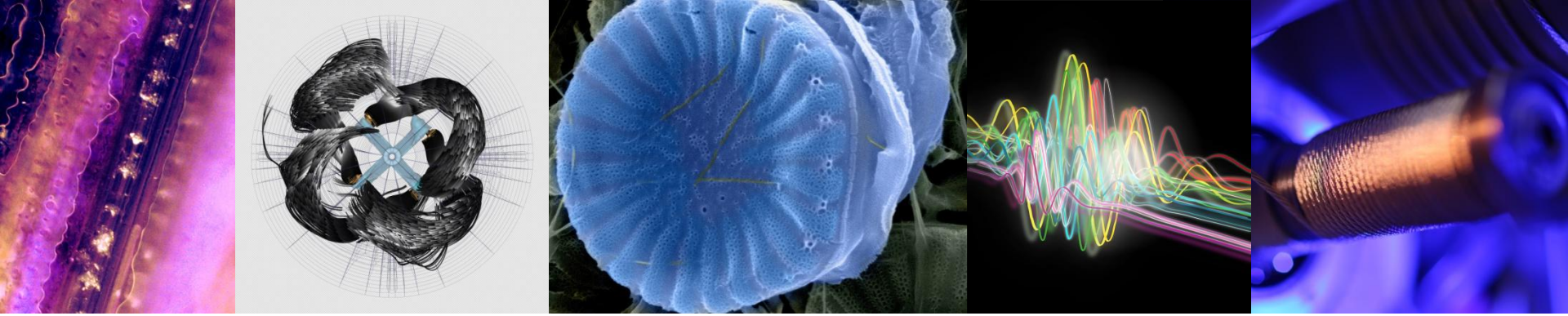
Other ENG Collaborators

- Rebecca Bates(AAAS Fellow); Dennis Carter (PD); Alan Cheville (PD); Brooke Coley (AAAS Fellow); Kerstin Mukerji (Science Assistant); Pamela Truesdell (Einstein Fellow)



- Designing a “Fast Pool”
- Designing Safety Helmets
- Engineering for Mobility
- Maximizing The Long Jump of Bryan Clay
- Measuring a Champion
- Missy Franklin and Fluid Dynamics
- Sarah Robles and The Mechanics of Weightlifting
- The Biomechanics of Usain Bolt
- The Impact of Jenny Simpson
- The Strength and Flexibility of Oscar Pistorius


One NSF



Questions

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